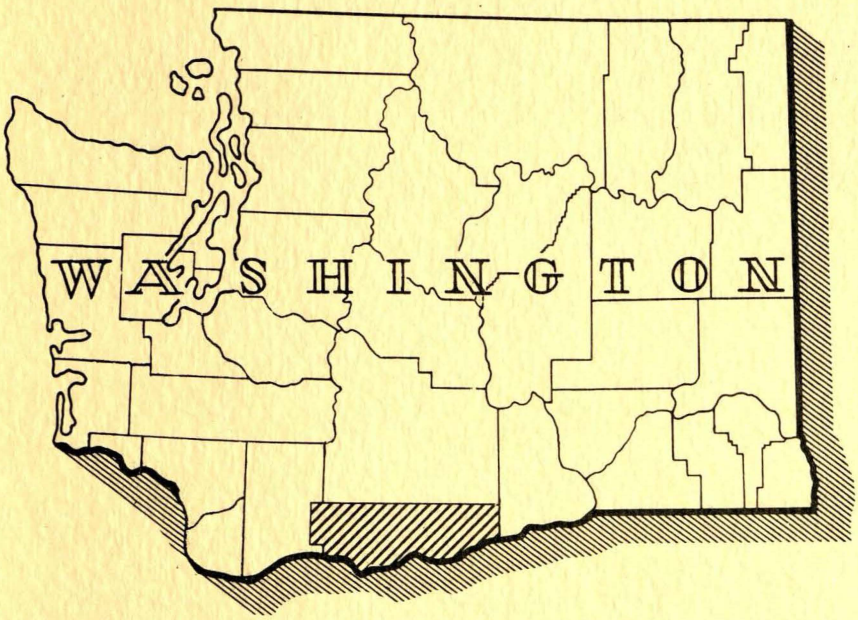
FOREST STATISTICS FOR KLICKITAT CO., WASHINGTON

FOREST SURVEY REPORT NO. 124



U. S. DEPARTMENT OF AGRICULTURE · FOREST SERVICE
PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
R. W. COWLIN, DIRECTOR

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1/ Acknowledgment is made of cooperation from public and private agencies in furnishing cutting and ownership records.

FOREST STATISTICS

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KLICKITAT COUNTY, WASHINGTON

Forest Survey Report No. 124

by

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and

Melvin P. Twerdal

U. S. Department of Agriculture Forest Service
Pacific Northwest Forest and Range Experiment Station

R. W. Cowlin, Director
March 1956

FOREWORD

This publication summarizes in statistical form the results of a reinventory of the forests of Klickitat County, Washington, conducted in 1954. This reinventory is a part of the maintenance phase of the Forest Survey, a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928 and amended June 25, 1949. The purpose of the Forest Survey is to periodically inventory the extent and condition of forest lands and the timber and other products on them, to ascertain rates of forest growth and depletion, to estimate present consumption of timber products and to analyze and make available in reports survey information needed in the formulation of forest policies and programs.

The Forest Survey is conducted in the various forest regions of the Nation by the regional forest experiment stations of the Forest Service. In the Pacific Northwest region of Oregon and Washington it is an activity of the Pacific Northwest Forest and Range Experiment Station at Portland, Oregon.

Under the initial phase of the Forest Survey the forests of Klickitat County were inventoried in 1935. A statistical report, "Forest Statistics for Klickitat County, Washington" and a detailed forest type map--scale 1 inch to the mile--were released. The reinventory has resulted in a revised statistical report and forest type map which is available on a scale of either 1 or 2 inches to the mile. 1/

1/ A print of the forest type map is available at cost of blueprinting. For information write Director, Pacific Northwest Forest and Range Experiment Station, P. O. Box 4059, Portland 8, Oregon.

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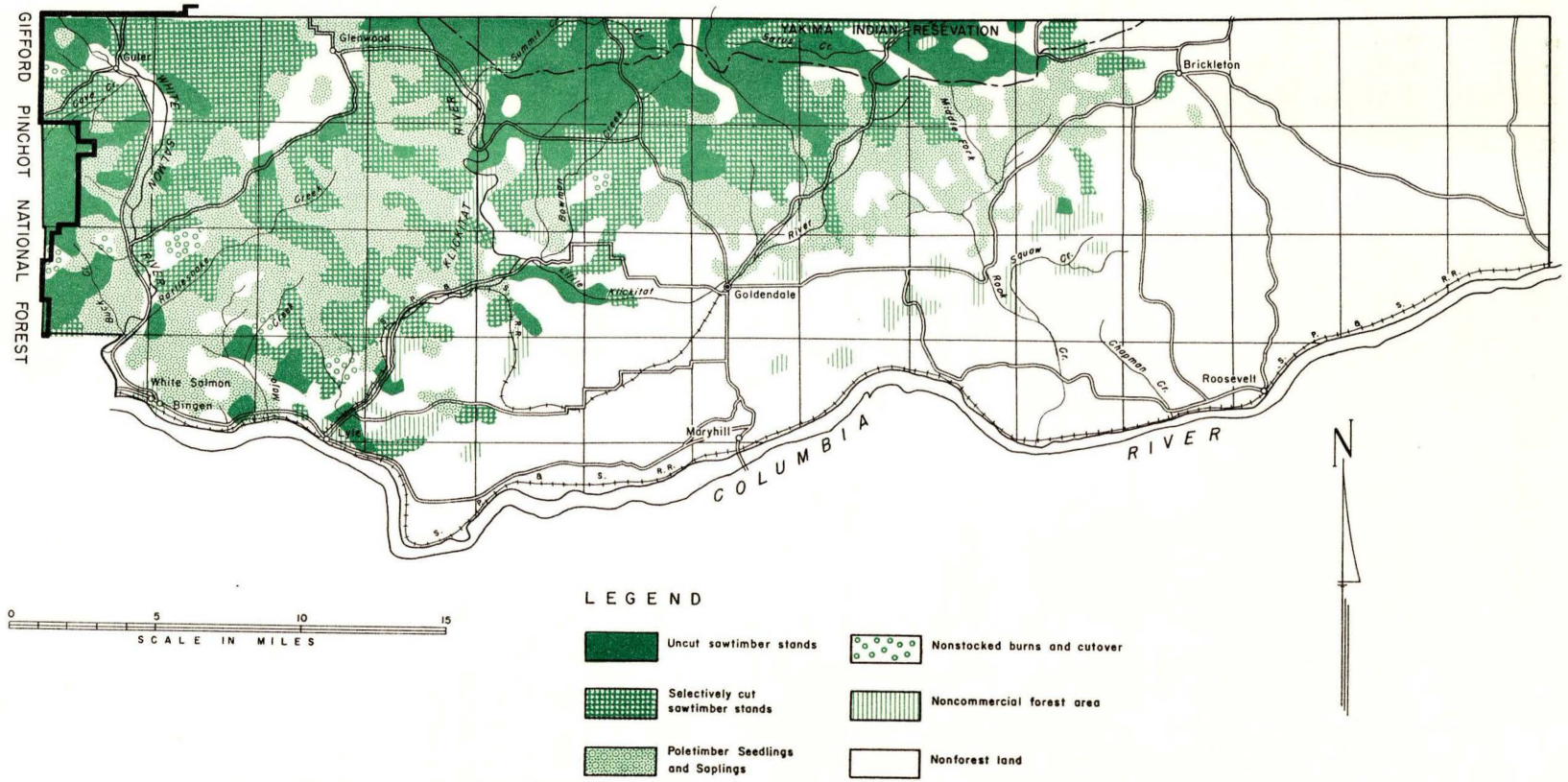
FIGURE 1

FOREST STAND-SIZE AND CONDITION CLASSES

KLICKITAT COUNTY, WASHINGTON

1954



SIGNIFICANT FINDINGS IN THE FOREST INVENTORY

GENERAL

Klickitat County is located in south-central Washington, with its entire southern boundary formed by the Columbia River. It is approximately 85 miles long, from 15 to 30 miles wide, and has a total land area of 1,224,000 acres. Topography varies from the high forested slopes of the Cascade Range in the west to the rolling hills and plateaus of the east. The Simcoe Mountains, a spur of the Cascades stretching eastward from Mt. Adams, extend along part of the northern border of the county.

The main drainage systems of the county flow south and are tributary to the Columbia River. The Klickitat and White Salmon Rivers, the county's two largest and most important streams, drain the west half while Rock Creek, Big Horn Canyon, and Alder Creek drain the east half.

Precipitation varies within the county, increasing from east to west. This has a marked influence on the vegetative cover. In the drier eastern portion vegetation is sparse and consists mainly of sagebrush and other herbaceous plants; in the west the cover is dense and is predominantly forest growth. Rainfall at Sixprong, most easterly Weather Bureau station, averages 8 inches and at White Salmon in the west average precipitation is 30 inches. At higher elevations in the northwestern part of the county rainfall greatly exceeds 30 inches.

Transportation of products by road, rail, and water are all feasible within the county. Travel to the east or west by road is possible on U. S. Highway 830 in Washington and U. S. Highway 30 in Oregon. Travel north and south on U. S. Highway 97 provides transportation through Goldendale to Yakima. The Spokane, Portland and Seattle Railroad follows the southern boundary of the county for its entire length and a branch line goes up the Klickitat River, terminating at Goldendale. The Columbia River is navigable to river craft, and transportation of bulky commodities such as wheat by barge and logs in rafts is common practice.

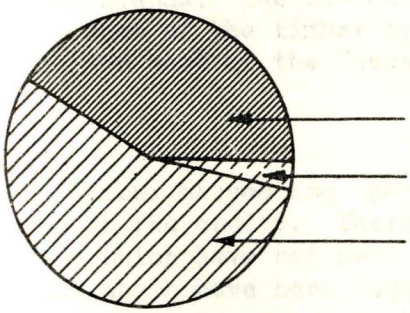
Logging and lumber industries are the only manufacturing industries of any consequence in the county. In 1954 they accounted for 98 percent of the total salaries paid by all manufacturers. Total wages paid in 1954 by all industries amounted to 18 million dollars, construction paid 11 million, logging and lumbering 5 million, and the remaining 2 million by trade, service, and other groups.

The population in 1950 numbered 12,049 inhabitants. This compares with the 1930 and 1940 estimates of 9,825 and 11,357 respectively. The population is predominantly rural with only two cities, Goldendale and White Salmon, having populations over 1,000.

LAND CLASSIFICATION

Klickitat County contains two broad land-use zones, the nonforest land in the east and the south and the forest zone in the west and north.

The nonforest zone, which contains most of the agricultural land in the county, occupies a little more than half the land area. According to the 1950 Census of Agriculture there are 216,000 acres of cropland and 417,000 acres of pasture in the county. These lands in agricultural use account for 92 percent of the total nonforest land area. Cash-grain crops and stock-raising are the most important types of agricultural use; wheat, beef cattle, and sheep are the county's most valuable exports.



CLASS	THOUSAND ACRES	PERCENT
COMMERCIAL FOREST	503	41
NONCOMMERCIAL FOREST	34	3
NONFOREST	687	56
TOTAL	1,224	100

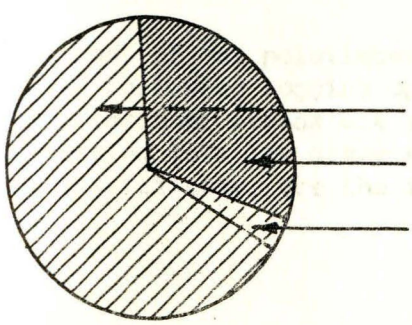
Commercial forest land occurs as an uninterrupted belt in the extreme west portion and extends eastward along the slopes of the Simcoe Mountains for a distance of approximately 60 miles until it becomes a fringe of trees strung along the canyon bottoms.

Noncommercial land consists of unproductive and productive but reserved forest land. Unproductive forest land occurs along the edge of the commercial forest zone in patches and long stringers. Reserved forest land is limited to 1,000 acres of municipal watershed of the city of Goldendale.

COMMERCIAL FOREST LAND AREA

Major Types

The two major types in the county are ponderosa pine and Douglas-fir. These make up practically all of the commercial forest area.



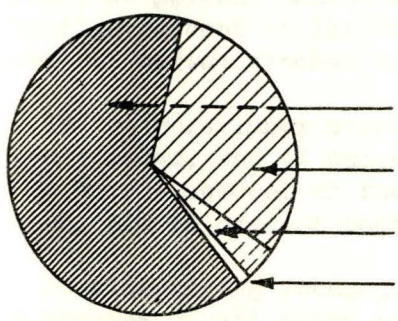
MAJOR TYPE	THOUSAND ACRES	PERCENT
PONDEROSA PINE	330	65
DOUGLAS-FIR	154	31
OTHER TYPES	19	4
TOTAL	503	100

Ponderosa pine stands extend the length of the forest zone along the northern border of the county and are adjacent to the nonforest zone along the Klickitat River south to the Columbia River. The pine belt has an average width of approximately 8 miles. The stands are almost pure pine on the northern and eastern edges of the pine zone; to the southwest they become mixed with associated species such as white fir, Douglas-fir, and western larch. In the ponderosa pine type the average stand has approximately three-fourths of its volume in pine.

Douglas-fir types are confined to the west portion of the forest area where they cover an area of 240 square miles. They become progressively more important from east to west until they dominate the forest stands. The character of the timber also improves to the west until some of the timber types are comparable to many in the Douglas-fir subregion west of the Cascade Range.

Stand-Size Class

Timber harvesting operations have occurred on two out of every three acres in the county. There still remain about 133,000 acres of sawtimber stands which have not been logged. About 188,000 acres of sawtimber stands which have been logged still retain sufficient volume--1,500 board feet or more per acre--to be classed as residual sawtimber stands. About three-fifths of the 217,000 acres of ponderosa pine sawtimber and a little more than half of the 93,000 acres of Douglas-fir sawtimber are in residual stands. A little more than half of the sawtimber stands are classified as large sawtimber, that is, with volume predominantly in trees more than 21 inches d.b.h.; the slightly smaller remaining area is in small sawtimber stands.



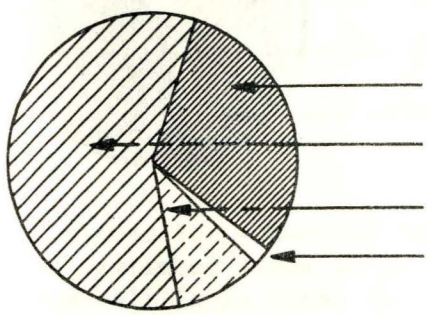
STAND SIZE	THOUSAND ACRES	PERCENT
SAWTIMBER	321	64
POLETIMBER	156	31
SEEDLING AND SAPLING	18	4
NONSTOCKED	8	1
TOTAL	503	100

Most of the poletimber and seedling and sapling stands were established following logging operations. In the ponderosa pine area many of the poletimber stands are residual stands which remain following timber harvesting to a low diameter limit. Other stands, more commonly in the Douglas-fir zone, are the result of restocking following clearcutting.

Nonstocked areas have been caused largely by fire. A comparison of the type map made in 1935 for the initial inventory with the new type map shows that much of the area nonstocked then because of fire is now stocked. Recent fires have created much of the present nonstocked area. Fire records show that large fires are infrequent. Since 1936, fires burning more than 1,000 acres have occurred only 4 times and the acreage burned ranged from 8,000 acres in 1939 to 2,000 acres in 1953. In the other 13 years the area burned has ranged from a low of 3 acres to 800 acres and averaged less than 200 acres annually.

Stocking of Young-Growth Stands

Most of the young-growth stands are adequately stocked. Eighty-eight percent of these stands, which include young-growth sawtimber, poletimber, and seedling and sapling classes, are medium to well stocked. The remaining 12 percent of the area is poorly stocked or nonstocked.



STOCKING CLASS	THOUSAND ACRES	PERCENT
WELL	110	30
MEDIUM	213	58
POOR	39	10
NONSTOCKED	8	2
TOTAL	370	100

About 33 percent of the ponderosa pine sawtimber stands are well stocked, 62 percent medium stocked, and 5 percent poorly stocked. Fifty-five percent of the Douglas-fir sawtimber stands are well stocked, 44 percent medium stocked and 1 percent poorly stocked.

In the poletimber stands 14 percent is well stocked, 69 percent medium stocked, and 17 percent poorly stocked. Seedling and sapling stands have 4 percent of their area well stocked, 56 percent medium stocked, and 40 percent poorly stocked.

In classifying young-growth stands for stocking, all commercial tree species of all sizes are considered in determining the degree or class of stocking. Thus, a young-growth sawtimber stand may be classed as well stocked on the basis of sawtimber-size trees, poletimber, seedlings and saplings, or any combination of these tree sizes.

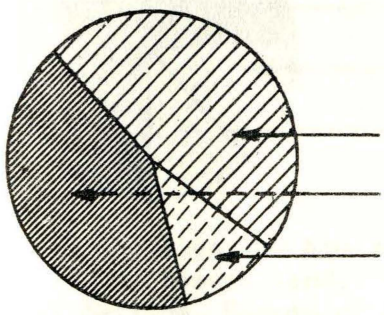
COMMERCIAL FOREST LAND TIMBER VOLUMES

The net volume of live sawtimber trees, 11.0 inches d.b.h. and larger, is estimated to be 4,309 million board feet log scale, Scribner rule, or 4,700 million board feet, International ¼-inch rule. Of the

total volume 4,189 million board feet or 97 percent is in sawtimber stands; the remaining 120 million is mainly in scattered sawtimber trees in the overstory of poletimber and seedling and sapling stands.

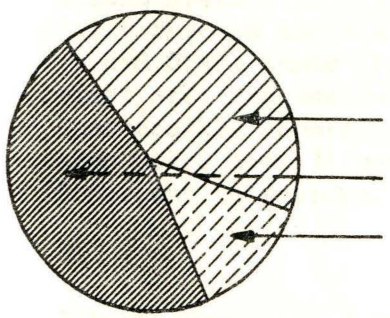
Species

Of the several tree species in the county, only ponderosa pine and Douglas-fir occur in appreciable quantities. Although the volume of each of these two species is about 2 billion board feet the ponderosa pine is distributed over considerably more area. The greater volume of Douglas-fir in relation to its type area is due to its relatively high volume per acre and its common occurrence in other types as an associate species.



SPECIES	SAWTIMBER MILLION BD. FT.	PERCENT
PONDEROSA PINE	2,013	47
DOUGLAS-FIR	1,809	42
OTHER SPECIES	487	11
TOTAL	4,309	100

Almost 70 percent of the total volume of softwood sawtimber is in large sawtimber trees which are 21 inches or over in diameter. Of this volume half is in trees 21 to 30.9 inches in diameter, about a quarter in trees from 31.0 to 40.9 inches, and the remaining quarter in trees 41.0 inches or more in diameter.



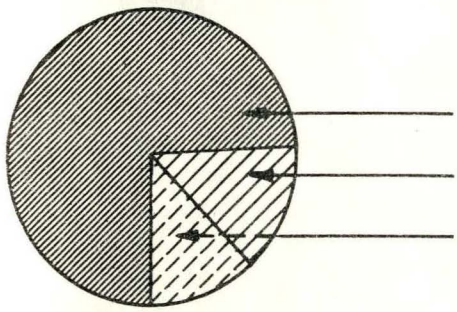
SPECIES	GROWING STOCK MILLION CU. FT.	PERCENT
PONDEROSA PINE	400	40
DOUGLAS-FIR	459	46
OTHER SPECIES	146	14
TOTAL	1,005	100

Growing-stock volume includes both poletimber-size trees 5.0 to 10.9 inches in diameter and sawtimber-size trees 11.0 inches and larger. Only a tenth of the ponderosa pine and Douglas-fir growing-stock volume is in poletimber-size trees, while almost a quarter of the volume in other species is made up of poletimber trees.

FOREST OWNERSHIP

Commercial Forest Land

Three-fourths of the commercial forest land is in private ownership and held by about 1,000 owners. There are 500 in size class 10 to 100 acres, 400 in size class 100 to 500, and 100 in size class over 500. These classes represent 7, 24, and 69 percent respectively of the total private commercial area.



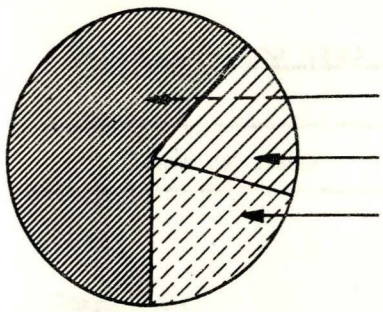
OWNERSHIP CLASS	THOUSAND ACRES	PERCENT
PRIVATE	372	74
STATE	73	14
FEDERAL	58	12
TOTAL	503	100

Public agencies are responsible for the management of about 26 percent of the forest land. Three Federal agencies--Bureau of Indian Affairs, Forest Service, Bureau of Land Management--manage forest lands in Klickitat County. The largest area, lying along the northern boundary, is the 41,000 acres in the Yakima Indian Reservation. The 9,000 acres in the Gifford Pinchot National Forest lies along the western edge of the county. The 8,000 acres of Public Domain lands, administered by the Bureau of Land Management, occur in scattered holdings throughout the forest zone.

A long history of utilization on private and State holdings has materially changed the stand-size class distribution on these lands. On private and State lands the uncut sawtimber stands occupy 20 percent of the forest area and residual sawtimber stands occur on 40 percent. The more inaccessible federally managed lands where comparable cutting has not taken place have 74 percent of their area in uncut sawtimber stands and 18 percent in residual sawtimber stands.

Sawtimber Volume

Private forest land which is more accessible and which has been logged more extensively has a smaller volume per acre than public forest land. Private lands have only 61 percent of the sawtimber volume but 74 percent of the area. Federal lands have 21 percent of the volume and 12 percent of the area.



OWNERSHIP CLASS	MILLION BD. FT.	PERCENT
PRIVATE	2,624	61
STATE	797	18
FEDERAL	888	21
TOTAL	4,309	100

FOREST UTILIZATION

The annual timber harvest in Klickitat County in 1953 was 147 million board feet, Scribner log scale. This volume of logs represented the largest production experienced in the county, and also exceeded the output of any other eastern Washington county in the same year. Since 1940, production of logs has been increasing within the county and in proportion to the total output for all eastern Washington counties. Prior to 1940, production ranged from 10 to 18 percent of the total; since 1940, with the exception of two low years, production has been from 16 to 28 percent of the total output.

Some of this increase has been due to increased logging activities on Federal lands. In 1949 almost 100 percent of the harvest came from private and State lands. Since 1949, the output of logs from national forests and Indian lands has increased until in 1953 harvest of timber from these lands made up 12 and 4 percent respectively of the total. The increased output from national forest lands is largely temporary, resulting from salvage of windthrown material and timber killed by the Douglas-fir bark beetle.

Table 1.--Land area by major classes of land, 1954

Class of land	Area
	Acres
Forest:	
Commercial	503,390
Noncommercial:	
Productive-reserved	1,040
Unproductive	32,650
Total	537,080
Nonforest	686,600
Total, all classes	1,223,680

Table 2.--Area of commercial forest land by ownership and stand-size classes, 1954

Ownership class	Total	Saw-timber stands	Pole-timber stands	Seedling and sapling stands	Nonstocked areas
	Acres	Acres	Acres	Acres	Acres
Private	371,840	218,490	136,170	12,940	4,240
State	73,180	49,070	16,680	4,880	2,550
Federally owned or managed:					
Indian	40,880	39,800	520		560
Bureau of Land Mgt.	7,950	4,870	2,690	310	80
National forest	9,540	8,750	230	280	280
Total Federal	58,370	53,420	3,440	590	920
All ownerships	503,390	320,980	156,290	18,410	7,710

Table 3.--Area of commercial forest land by major forest type and stand-size class, 1954

Forest type	Total	Sawtimber stands		Pole-timber stands	Seedling and sapling stands	Non-stocked areas
		Large[1]	Small[2]			
	Acres	Acres	Acres	Acres	Acres	Acres
Ponderosa pine	330,210	132,310	84,840	106,890	6,170	
Lodgepole pine	4,940		4,820	80	40	
Douglas-fir	153,850	43,740	49,100	49,000	12,010	
Fir-spruce	5,760	960	4,610		190	
Hardwoods	920		600	320		
Nonstocked areas	7,710					7,710
Total	503,390	177,010	143,970	156,290	18,410	7,710

1/ 21 inches d.b.h. and larger.

2/ 11 to 21 inches d.b.h.

Table 4.--Land area by cover type, ownership class and land-use class, 1954

Cover type	Total all ownerships	Unreserved						Reserved	
		Total	Private	State	Federally owned or managed			Total	Municipal
					Indian	Bureau of Land Mgt.	National forest		
PRODUCTIVE FOREST LAND									
	Commercial							Noncommercial (productive-reserved)	
	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Ponderosa pine large sawtimber	132,350	132,310	85,450	15,360	30,130	1,360	10	40	40
Ponderosa pine small sawtimber	84,840	84,840	72,500	7,560	3,010	1,740	30		
Ponderosa pine poletimber	107,130	106,890	96,370	7,390	520	2,610		240	240
Ponderosa pine seedlings and saplings	6,170	6,170	4,870	1,180		120			
Lodgepole pine small sawtimber	5,460	4,820	1,850	210	2,720	40		640	640
Lodgepole pine poletimber	80	80	80						
Lodgepole pine seedlings and saplings	40	40	40						
Douglas-fir large old-growth sawtimber (yellow fir)	620	620	120	500					
Douglas-fir small old-growth and large young-growth sawtimber (red fir)	43,120	43,120	18,090	14,700	1,270	940	8,120		
Douglas-fir small sawtimber	49,100	49,100	37,480	10,570		790	260		
Douglas-fir poletimber	49,000	49,000	39,400	9,290		80	230		
Douglas-fir seedlings and saplings	12,010	12,010	8,030	3,660		40	280		
White fir large sawtimber	960	960	600		360				
White fir small sawtimber	2,890	2,890	1,840		720		330		
White fir seedlings and saplings	190	190		40		150			
True fir-mountain hemlock small sawtimber	1,840	1,720		130	1,590			120	120
Hardwood small sawtimber	600	600	560	40					
Hardwood poletimber	320	320	320						
Recent clearcut area, nonstocked	480	480	480						
Old clearcut area, nonstocked	200	200	200						
Deforested by fire, nonstocked	7,030	7,030	3,560	2,550	560	80	280		
Total	504,430	503,390	371,840	73,180	40,880	7,950	9,540	1,040	1,040
NONCOMMERCIAL UNPRODUCTIVE FOREST LAND									
Noncommercial rocky	920	920	820	100					
Oak-madrone	31,730	31,690	28,080	1,280	640	1,690		40	40
Total	32,650	32,610	28,900	1,380	640	1,690		40	40
NONFOREST LAND									
Agricultural, grass, and brush, and open--nonvegetative	686,600	686,520	unclassified as to ownership					80	80
ALL LAND									
Forest land									
Commercial	503,390	503,390	371,840	73,180	40,880	7,950	9,540		
Noncommercial (productive-reserved and unproductive)	33,690	32,610	28,900	1,380	640	1,690		1,080	1,080
Total forest land	537,080	536,000	400,740	74,560	41,520	9,640	9,540	1,080	1,080
Nonforest land	686,600	686,520	unclassified as to ownership					80	80
Total all land	1,223,680	1,222,520						1,160	1,160

Table 5.--Area of commercial forest land by forest-condition and ownership classes, 1954

Forest-condition class	Total	Private	State	Federally owned or managed		
				Indian	Bureau of Land Mgt. 1/	National forest
	Acres	Acres	Acres	Acres	Acres	Acres
Conifer large sawtimber						
Uncut	101,250	51,110	15,500	24,780	1,740	8,120
Residual	75,760	53,150	15,060	6,980	560	10
Total	177,010	104,260	30,560	31,760	2,300	8,130
Conifer small sawtimber						
Uncut	31,930	19,340	4,270	6,790	940	590
Residual	111,440	94,330	14,200	1,250	1,630	30
Total	143,370	113,670	18,470	8,040	2,570	620
Conifer poletimber						
On cutovers	144,560	128,580	13,050	360	2,530	40
On plantations	40	40				
On other	11,370	7,230	3,630	160	160	190
Total	155,970	135,850	16,680	520	2,690	230
Conifer seedlings and saplings						
On cutovers	15,230	12,380	2,730		120	
On plantations	200	200				
On other	2,980	360	2,150		190	280
Total	18,410	12,940	4,880		310	280
Hardwoods						
Sawtimber	600	560	40			
Poletimber	320	320				
Total	920	880	40			
Nonstocked Total	7,710	4,240	2,550	560	80	280
Total	503,390	371,840	73,180	40,880	7,950	9,540

1/ All public domain land.

Table 6.--Area of young-growth timber stands on commercial forest land by density-of-stocking class, species group, stand-size class, and nonstocked areas, 1954

Stocking class and species group	Total	Sawtimber		Poletimber	Seedlings and saplings	Non-stocked
		Large 1/ young growth	Small young growth			
	Acres	Acres	Acres	Acres	Acres	Acres
Well stocked:						
Softwoods	109,490	32,430	54,120	22,190	750	
Hardwoods	720		600	120		
Total	110,210	32,430	54,720	22,310	750	
Medium stocked:						
Softwoods	212,390	10,690	84,020	107,410	10,270	
Hardwoods	200			200		
Total	212,590	10,690	84,020	107,610	10,270	
Poorly stocked:						
Softwoods	38,990		5,230	26,370	7,390	
Hardwoods						
Total	38,990		5,230	26,370	7,390	
Nonstocked	7,710					7,710
All classes:						
Softwoods	360,870	43,120	143,370	155,970	18,410	
Hardwoods	920		600	320		
Nonstocked	7,710					7,710
Total	369,500	43,120	143,970	156,290	18,410	7,710

1/ Includes only the stands classified and mapped as Douglas-fir large young-growth sawtimber type.

Table 7.--Net volume of live sawtimber and growing stock on commercial forest land by ownership class, 1954

Ownership class	Sawtimber		Growing stock
	Million board feet, log scale, Scribner rule	Million board feet, International ¼-inch rule	Million cubic feet
Private	2,624	2,873	632
State	797	866	182
Federally owned or managed:			
Indian	525	571	115
Bureau of Land Mgt.	74	80	17
National forest	289	310	59
Total Federal	888	961	191
All ownerships	4,309	4,700	1,005

Table 8.--Net volume of live sawtimber and growing stock on commercial forest land by stand-size class, 1954

Stand-size class	Sawtimber		Growing stock
	Million board feet, log scale, Scribner rule	Million board feet, International ¼-inch rule	Million cubic feet
Sawtimber stands	4,189	4,564	953
Poletimber stands	119	135	51
Seedling and sapling stands	1	1	1
Nonstocked areas	*	*	*
Total	4,309	4,700	1,005

* Less than 500 thousand.

Table 9.--Net volume of live sawtimber and growing stock on commercial forest land by species, 1954

Species	Sawtimber		Growing stock
	Million board feet, log scale, Scribner rule	Million board feet, International ¼-inch rule	Million cubic feet
Softwoods:			
Ponderosa pine	2,013	2,198	400
Western white pine	27	29	6
Lodgepole pine	3	3	1
Douglas-fir	1,809	1,975	459
Western larch	61	67	13
Western hemlock	2	2	1
Western redcedar	29	31	6
True firs 1/	361	390	111
Total	4,305	4,695	997
Hardwoods 2/	4	5	8
All species	4,309	4,700	1,005

1/ Consists mainly of grand fir and includes a small volume of Pacific silver fir.

2/ Consists of Oregon white oak. Species not listed here that occur in the county are red alder, bigleaf maple, and black cottonwood.

Table 10.--Net volume of live sawtimber on commercial forest land by diameter-class group, species group and log rule, 1954

Diameter class and log rule	Total	Ponderosa pine	Douglas-fir	True firs	Western white pine	Other softwoods	Hardwoods
	- - - Million board feet - - -						
11.0" to 20.9" d.b.h.							
Scribner rule	1,297	530	546	176	15	28	2
International $\frac{1}{4}$-inch rule	1,489	614	634	190	16	33	2
21.0" to 30.9" d.b.h.							
Scribner rule	1,493	812	507	103	12	57	2
International $\frac{1}{4}$-inch rule	1,611	877	547	111	13	60	3
31.0" to 40.9" d.b.h.							
Scribner rule	810	415	359	26		10	
International $\frac{1}{4}$-inch rule	860	440	381	29		10	
41.0" d.b.h. and larger							
Scribner rule	709	256	397	56			
International $\frac{1}{4}$-inch rule	740	267	413	60			
All diameter classes							
Scribner rule	4,309	2,013	1,809	361	27	95	4
International $\frac{1}{4}$-inch rule	4,700	2,198	1,975	390	29	103	5

Table 11.--Net volume of all timber on commercial forest land by class of material and species group, 1954

Class of material	Total	Softwoods	Hardwoods
	Million cubic feet	Million cubic feet	Million cubic feet
Growing stock:			
Sawtimber trees:			
Sawlog portion	807	805	2
Upper stem portion	61	61	*
Total	868	866	2
Poletimber trees	137	131	6
Total growing stock	1,005	997	8
Other material:			
Sound cull trees	*		*
Rotten cull trees	9	8	1
Salvable dead trees	5	5	
Total other material	14	13	1
Total, all timber	1,019	1,010	9

* Less than 500 thousand.

Table 12.--Average annual cut of live sawtimber and growing stock on commercial forest land by species group for the period 1949-53 incl.

Species group	Sawtimber						Growing stock		
	Timber products	Logging residues	Annual cut 1/	Timber products	Logging residues	Annual cut 1/	Timber products	Logging residues	Annual cut 1/
	Thousand board feet, log scale, Scribner rule			Thousand board feet, International ¼-inch rule			Thousand cubic feet		
Softwoods	101,114	5,592	106,706	110,285	6,099	116,384	20,386	2,450	22,836
Hardwoods 2/									
Total	101,114	5,592	106,706	110,285	6,099	116,384	20,386	2,450	22,836

1/ Annual cut is sum of timber products and logging residues.

2/ Hardwood cut is insignificant.

FOREST SURVEY PROCEDURE

The procedures used in the Forest Survey reinventory of Klickitat County were materially different from the procedures used in the initial inventory. This change in procedure accounts for some significant differences in both the forest-area and timber-volume statistics obtained. Therefore, a brief description of each of the procedures seems desirable.

Initial Inventory

The initial inventory of the county was conducted in 1935 by what is known as the compilation method. In this method existing information on forest types, timber cruises and logging records, and other pertinent data were collected from private timber owners and various public agencies. These data were checked in the field for reliability and were adjusted to the then existing specifications and standards of Forest Survey. Forest-type and timber-volume data for areas not covered by reliable existing information were obtained through field reconnaissance.

All land in the county was classified as either forest or nonforest. Forest land was further classified as commercial or noncommercial; the commercial was still further classified by forest type, stand-size or condition class, and in case of young growth, by stocking class. All such types and classes were mapped in place on 1-inch-to-the-mile base maps of each forested township. These township type maps were then superimposed over current ownership-status plats and dot counted to obtain forest-type-area statistics by ownership class. Type delineations on the township maps were traced to a base map of the county to form a county forest type map. The commercial forest land was also classified as to site quality, or forest productive capacity.

In-place, timber-volume estimates were based on existing cruises collected and adjusted to the Forest Survey standard, on field samples, and on ocular appraisals. Cruises made by commercial cruisers were obtained for most of the privately owned timber. Separate volume estimates were computed for each of the commercial tree species and for each ownership class. Methods used in this initial inventory did not permit a statistical computation of accuracy of the estimate.

Reinventory

In the reinventory in 1954 the forest type map of the county was completely revised. This revision was accomplished through interpretation, classification, and field mapping on aerial photos which covered all of the county. In the delineation of types and conditions on aerial

photos similar types were examined on the ground to ensure accuracy in interpretation. The presence of old and new roads through much of the forested area greatly facilitated these examinations. Types, stand-size classes, and stocking classes were similar to those recognized in the initial inventory. However, field mapping on aerial photos resulted in much greater accuracy and detail than was possible in the earlier inventory through ground reconnaissance alone. Type delineations on the aerial photos were transferred to a 2-inch scale county planimetric base map through use of a photo projector. The new type map was then superimposed over a current ownership-status map and a dot count made of forest type areas by ownership class.

Estimates of net volumes of live sawtimber, growing stock, rotten and sound cull, and salvable-dead material were developed by applying average-per-acre volumes to the appropriate forest type acreages. The per-acre volumes for stands of sawtimber and poletimber were obtained through a sampling procedure in which the stands were measured on randomly selected plots. Comparable sawtimber and poletimber per-acre volumes contained in scattered trees in the overstory of seedling and sapling stands and nonstocked areas were based on empirical estimates. In the random selection of samples each individual sawtimber or poletimber plot in the county had an equal chance to be chosen. A sample consisted of a series of three one-fifth-acre circular plots spaced at 6-chain intervals. Intensity of the sampling was designed to produce a total estimate of volume within a specified sampling accuracy.

ACCURACY OF 1954 REINVENTORY DATA

Forest Area

In the reinventory of the county, in-place mapping of the forests and their classification by forest type, stand-size class, or condition class, were on the basis of 100-percent coverage. Thus no error due to sampling was involved. Errors due to techniques or judgment in the field and in office computation of data were possible, but difficult to evaluate. Throughout all phases of the work close supervision and frequent checks assured a high level of accuracy and uniformity of standards.

Timber Volume

The chances are 19 out of 20 that the board-foot volume of live sawtimber, if measured by a 100-percent cruise, would be within plus or minus 31.8 percent of the estimated total of 4,309 million board feet, log scale, Scribner rule. On the same basis, cubic-foot volume of growing stock from a 100-percent cruise would be within a range of plus or minus 26.2 percent of the estimated 1,005 million cubic feet. Volume estimates by species, stand-size class, or other subdivision have greater sampling errors.

DIFFERENCE IN RESULTS OF INVENTORIES

Some of the differences in forest-type and timber-volume statistics resulting from the initial inventory and reinventory are due to actual physical change. Other differences are due to variations in procedures used, in interpretation and classification of forest conditions, and in standards of utilization. Because of these differences direct comparison of the statistics may not be meaningful except insofar as these differences are taken into account.

Forest Area

Forest-area statistics resulting from the inventories are shown in the following table:

Inventory	Total forest land	Noncommercial unproductive	All other forest areas 1/				
			Total	Sawtimber		Poletimber, seedlings and saplings	Nonstocked
				Uncut	Residual		
	Thousands of acres						
1935	539	45	494	301	77	96	20
1954	537	33	504	134	188	174	8

1/ Includes commercial and noncommercial but productive forest land.

Differences in the areas of stand-size and condition classes reflect in part both real changes, such as those brought about by logging or growth, as well as differences brought about by changes in the survey procedure and specifications. In general, during the 19 years between inventories it appears that (1) no appreciable change has occurred in the area of forest land; (2) the decreased area of noncommercial unproductive forest land is due to changing standards of utilization which now consider as merchantable stands formerly classified unproductive; (3) logging which has materially reduced the area of uncut sawtimber stands has resulted in an increased area of residual sawtimber stands; (4) the large increase in poletimber and seedling and sapling stands is due in part to ingrowth and restocking of cutover and nonstocked areas; and (5) reproduction has become established on much of the area nonstocked in 1934 and clearcut between 1934 and 1954.

Timber Volume

The estimates of sawtimber volume obtained in the two inventories are shown in the following tabulation:

Inventory	Total	Ponderosa pine	Douglas-fir	Other species
	Million board feet, log scale, Scribner rule			
1935	3,494	1,722	1,563	209
1954	4,309	2,013	1,809	487

It is probable that several factors influenced the two respective estimates of timber volumes in the county.

One factor that increased the board-foot volume of sawtimber during the 18 years between inventories was forest growth--net growth in sawtimber trees and the ingrowth of poletimber trees into the sawtimber class. An offsetting factor, one that reduced the sawtimber inventory since 1935, was drain due to timber cutting and to the various natural depleting agencies, such as forest insects, diseases, windthrow, and fire.

Another factor of substantial influence was the variation, between inventories, in the procedures used and in the specifications upon which the two estimates were based as outlined previously under Survey Procedures.

The influence of difference in procedures cannot be closely evaluated. The 1954 volume estimate has a calculated sampling error (see page 19 under Accuracy of Reinventory Data, Timber Volume). However, no statistical evaluation of the accuracy of the 1935 estimate can be made.

Another cause of the difference in volumes may have been the variation in standards of utilization between inventories. The standards for Douglas-fir, white fir, and western larch were changed between surveys to take cognizance of the increased degree of industrial use of these species. In 1954 volume tables were used that gave a materially greater volume for a tree of a given size than did the tables used in the 1935 inventory. Other changes included lowering the minimum merchantable top diameter of a sawtimber tree, and reduction of the minimum requirement of net sound volume in a sawtimber tree from 33-1/3 to 25 percent of gross volume.

Because of the influence of these, and possibly other, factors the two estimates are not on a comparable basis and do not necessarily reflect a trend in the county's total volume of sawtimber.

DEFINITION OF TERMS USED

Land Area

Total Land Area

Includes dry land and unmeandered water surface.

Forest Land Area

Includes (a) land which is at least 10-percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; and (b) land from which the trees described in "(a)" have been removed to less than 10-percent stocking and which has not been developed for other use. Minimum area of forest land recognized in reinventory of the county is 10 acres.

Nonforest Land Area

Land that does not qualify as forest land. Minimum area recognized in the reinventory of the county is 10 acres.

Forest Land Classes

Commercial Forest Land Area

Forest land which is producing, or is physically capable of producing, usable crops of wood, economically available now or prospectively, and not withdrawn from timber utilization.

Noncommercial Forest Land Area

Forest land (a) withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land, and (b) incapable of yielding usable wood products (usually sawtimber) because of adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future.

Types

Forest Land Types

Forest land is typed on the basis of predominant species as indicated by cubic volume for sawtimber and poletimber stand, and number of trees for seedling and sapling stands, or as a forest condition

such as nonstocked cutover, or burned-over land. Where none of the indicated species comprises 50 percent or more of a given stand, the stand is typed on the basis of plurality of cubic volume or number of trees. In classifying forest land by type the minimum area recognized is 40 acres.

Commercial Forest Land

Major forest types. Local forest types are grouped into generalized types. The major forest types in Klickitat County are as follows:

Ponderosa pine. Forests in which 50 percent or more of the stand is ponderosa pine.

Douglas-fir. Forests in which 50 percent or more of the stand is Douglas-fir.

Fir-spruce. Forests in which 50 percent or more of the stand is true fir or Engelmann spruce.

Lodgepole pine. Forests in which 50 percent or more of the stand is lodgepole pine.

Hardwood. Forests in which 50 percent or more of the stand is Oregon white oak, or other western hardwoods, singly or in combination.

Noncommercial Forest Land

Productive-reserved. Forest land withdrawn from timber utilization through statute, ordinance, or administrative order, but which otherwise qualifies as commercial forest land.

Unproductive. Forest land incapable of yielding usable wood products (usually sawtimber) because of adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future.

Nonforest Land Types

Agricultural. Cultivated land or stump pasture.

Grass and brush. Grass or brush on nonforest land.

Open-nonvegetative. Includes barrens, tideflats, towns, and unmeandered water.

Tree Classes

Sawtimber Tree

Tree of commercial species, 11 inches d.b.h. or larger, that contains at least one 16-foot softwood sawlog or one 8-foot hardwood sawlog to a variable top diameter never less than 8 inches inside the bark. Twenty-five percent or more of the gross board-foot volume must be free from rot or defect.

Poletimber Tree

Softwood or hardwood tree 5.0 to 10.9 inches d.b.h. of commercial species in which 25 percent or more of the gross cubic-foot volume is free from rot and defect.

Seedling and Sapling Trees

Live trees of commercial species less than 5.0 inches d.b.h. and of good form and vigor.

Cull Tree

Live tree of sawtimber or poletimber size that is unmerchantable, now or prospectively, because of defect, rot, or species.

Sound cull tree. Live tree of sawtimber or poletimber size which contains 25 percent or more of sound volume but will not make at least one merchantable log, now or prospectively, because of roughness or poor form.

Rotten cull tree. Live tree of sawtimber or poletimber size in which less than 25 percent of the total volume is sound.

Salvable Dead Tree

Standing dead or down tree which contains 25 percent or more of sound volume and at least one merchantable 16-foot softwood or 8-foot hardwood log.

Stand-Size Classes

Sawtimber Stand

Stand of sawtimber trees having a minimum net volume per acre of 1,500 board feet, log scale, International $\frac{1}{4}$-inch rule.

Large sawtimber stand. Stand in which 50 percent or more of the volume is in trees more than 21.0" d.b.h.

Small sawtimber stand. Stand in which 50 percent or more of the volume is in trees from 11.0" to 20.9" d.b.h.

Poletimber Stand

Stand failing to meet sawtimber-stand specifications but at least 10-percent stocked with poletimber and larger (5.0" d.b.h. and larger) trees and at least half the minimum stocking in poletimber trees.

Seedling and Sapling Stand

Stand not qualifying as either sawtimber or poletimber stand but having at least 10-percent stocking of trees of commercial species and with at least half the minimum stocking in seedling and sapling trees.

Uncut Sawtimber Stand

Sawtimber stand that is essentially undisturbed by cutting.

Residual Sawtimber Stand

Sawtimber stand in which a partial harvest has been made, and in which the residual volume amounts to 1,500 board feet or more per acre.

Stocking

Stocking is the extent to which growing space is effectively utilized by present or potential growing stock trees of commercial species. "Degree of stocking" is synonymous with "percent of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Stocking may be measured in terms of number of trees, volume, basal area, cover canopy, or other criterion, or combination of criteria.

Well-stocked stands. Stands that are 70 percent or more stocked with present or potential growing-stock trees.

Medium-stocked stands. Stands that are 40 to 69 percent stocked with present or potential growing-stock trees.

Poorly stocked stands. Stands that are 10 to 39 percent stocked with present or potential growing-stock trees.

Nonstocked areas. Areas that are 0 to 10 percent stocked with present or potential growing-stock trees.

Timber Volume

Live Sawtimber Volume

Net volume in board feet of live sawtimber trees of commercial species.

Scribner rule. The common board-foot rule used in determining log-scale volume of sawtimber in the Pacific Northwest.

International ¼-inch rule. The standard board-foot rule adopted nationally by the Forest Service in the presentation of Forest Survey volume statistics.

Growing Stock

Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) inside bark.

All-Timber Volume

Net volume in cubic feet of live and salvable dead sawtimber trees and poletimber trees of commercial species, and cull trees of all species from stump to a minimum 4.0-inch top inside bark.

Tree Species

Tree species commonly found in Klickitat County include:

Softwoods:
- Ponderosa pine (*Pinus ponderosa*)
- Western white pine (*Pinus monticola*)
- Lodgepole pine (*Pinus contorta*)
- Douglas-fir (*Pseudotsuga menziesii*)
- Grand fir (*Abies grandis*)
- Pacific silver fir (*Abies amabilis*)
- Western larch (*Larix occidentalis*)
- Western hemlock (*Tsuga heterophylla*)
- Western redcedar (*Thuja plicata*)

Hardwoods: Red alder (Alnus rubra)
Bigleaf maple (Acer macrophyllum)
Oregon white oak (Quercus garryana)
Black cottonwood (Populus trichocarpa)

Timber Cut

Annual Cut of Live Sawtimber

The net board-foot volume of live sawtimber trees cut or killed by logging on commercial forest land during a specified year.

Timber products from live sawtimber. The volume of timber products cut from live sawtimber.

Logging residues from live sawtimber. The net board-foot volume of live sawtimber trees cut or killed by logging on commercial forest land and not converted to timber products.

Annual Cut of Growing Stock

The net cubic-foot volume of live sawtimber and poletimber trees cut or killed by logging on commercial forest land during a specified year.

Timber products from growing stock. The volume of timber products cut from growing stock.

Logging residues from growing stock. The net cubic-foot volume of growing stock cut or killed by logging on commercial forest land and not converted to timber products.